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Value creation of hedge fund activism and the impact on long term returns and volatility of the target company

ABSTRACT

This study provides new evidence on value creation ability of hedge fund activism and its effects on target firm's riskiness and long-term returns. With the data-set from SEC Edgar 13D filings 215 events were identified and tested about the common beliefs that hedge fund activism increases the medium- and long term volatility of the target and adversely affects target company's long term returns. The findings suggest that neither belief is supported by the data. In fact, targets are able to maintain the abnormal returns in the long term as well, which indicate about the value creation ability of hedge fund activists. The results are mainly consistent with existing literature but also offer some new evidence about negative correlation between target firms' returns and the value premium after the activist intervention.

Finance

Bachelor's thesis

Autumn 2016

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1 Introduction

Hedge fund activism is an increasingly common phenomenon where a hedge fund buys a portion of a company that according to the fund is undervalued or badly managed. The fund will then campaign for a purpose or specific actions that it believes will help company to reach its true potential and hopefully create value to all the shareholders including the fund itself. Hedge fund activism has steadily gained publicity and is considered one of the major forces shaping financial markets in America. According to The Economist (2015) 15% of the members of the S&P 500 index of America's biggest firms have faced an activist campaign since the end of 2009. The Economist also estimates that about 50% of S&P 500 firms have had an activist on their share register over the same period.

The academic debate has mainly concentrated on whether hedge fund activism actually creates value. Majority of literature so far have focused on the announcement return around hedge funds intervention (Brav et al. 2008, Klein and Zur, 2006 and Greenwood and Schor, 2007) and it has been shown that there are abnormal returns to be made in the short run. Initial explanation for this is that when hedge fund announces that it has acquired a stake of the firm market believes that activist can intervene firm's management in a positive way that increases the value of the firm. On the other hand, the main competing hypothesis is that the announcement return is not due to hedge funds intervention but rather result of a disclosure of an undervalued stock. According to this hypothesis the hedge funds' target firms that are undervalued. Consequently, the market reacts positively to hedge fund's stock purchase because it believes that the hedge fund has identified an undervalued company - not because it believes that hedge fund can enhance shareholder value of the target. (Brav et al., 2009)

Although there is evidence of short term abnormal returns, there is much unknown about how the hedge fund activism affects the target firm's returns in the long term. In United States the common belief of policyholders and in debate in corporate governance is that hedge fund activists negatively affect to target companies' long term performance (Bebchuck et al., 2015). The understanding is that hedge fund's intervention will make company more unstable and more prone to negative shocks.

The purpose of this study is to analyze how the target companies of the hedge fund activists perform in the medium to long term (1 to 4 years) and what is the effect of the activism to target firm's overall riskiness. This paper sheds also light on the argued issue of whether hedge fund activists actually create value to their target company's shareholders.

This study uses a manually-collected dataset of SEC Edgar Schedule 13D filings to identify hedge fund activists and their targets. It then examines what has been the impact of activist intervention to companies' medium- and long term volatility. When testing the change of volatility in the dataset with a control sample, this study shows that the volatilities of the target firms have not increased more than their peers following the SEC filing. The second issue - whether the long-term returns have been affected by the intervention is then addressed by two standard methods commonly used by financial economists: the calendar-time portfolio analysis and buy-and-hold abnormal returns. The findings show that after the activist intervention the long-term stock returns of the target companies have not become worse but have improved instead.

It is important to understand the effects of this increasingly common phenomenon. When planning of financial market policies and regulation, the decision makers need to understand what are the major forces driving stocks of target companies and do hedge fund activists create value, identify undervalued stocks or actually have adverse effect on their targets' performance. Currently 80% of activist interventions happen in North America where the culture and legal systems are better suited to shareholder revolts than those in Europe or Asia (Economist 2015), but it possible that through the consolidation of capital markets in Europe, hedge fund activism will be increasingly common in there as well. At best hedge fund activism can be a powerful tool that allows better shareholder participation with the invested company.

2 Literature review

In the 21st Century hedge fund activism has risen as a new way of shareholder activism to engage the management of an invested firm and create value with reforms in firm's governance, operations or finance (Brav et al. 2009). The activism works in a way that investor buys a stake from a company which it believes is badly managed or undervalued and then engages with management and campaigns for a cause that hopefully will raise the share price to its potential value. Sometimes these interventions are friendly and sometimes hostile. It depends on the company's current management and the board whether they co-operate with the investor or not.

2.1 Value creation or stock picking?

The fundamental debate in hedge fund activism literature has concentrated on whether activism actually creates value. Mainly studies have focused on the short-term effects and announcement returns of hedge fund activism.

Researchers have presented evidence that the target firms produce abnormal returns around the SEC filing. Greenwood and Schor (2009) show that the average abnormal return for the [−10, +5] window is 3.6% for their sample. It is especially high for events related to asset sales and block mergers for the target firm. In addition, Klein and Zur (2009) found that the average abnormal return is 7.2% for the [−30, +30] window around the SEC filing. Clifford's (2008) sample from 1998 to 2005 and sample from Boyson and Mooradian (2007) from 1994 to 2005 also document significantly positive average abnormal announcement day stock performance ranging from 3.4 to 8.1% for various event windows. Therefore, these results strongly indicate that market reacts positively to news that a hedge fund starts an activist campaign. Also, there is reason to believe that this positive market reaction is due to hedge fund activist's ability to create value with its structural changes. Next, this topic is addressed.

Unlike many other institutional investors hedge funds have strong incentive to intervene with how companies are led. Campaigning against the management with different corporate governance strategies like proxy fights can be costly and intervening requires strong financial incentives. For traditional institutional investors the Investment Company Act 1940 limits the performance fees for financial managers. However, hedge funds are not bind by this since usually they have a small number of relatively sophisticated investors thus they commonly receive a large proportion (e.g., 20%) of excess returns as performance fees on top of fixed management fees. Traditionally the managers of hedge funds invest a substantial amount from their personal wealth into their own funds (Brav et al. 2009), which also incentivize to activism.

Being a hedge fund also offers more flexibility to activism. Brav et al. (2008) noted that hedge fund managers are able to take much larger relative positions than other institutions because they are not required by law to maintain diversified portfolios. Hedge funds may hold large percentage stakes in individual companies and may require that investors agree to "lock-up" their funds for a period of two years or longer. In contrast, mutual funds are required by law to hold diversified portfolios, and to sell securities within one day to satisfy investor redemptions. Specifically, Klein & Zur (2006) point out that mutual funds cannot own more than 10% of any company's securities and more than 5% of the total fund assets cannot be invested in one security. All these incentives and benefits are believed to mitigate the free rider problems that are generally present with other types of shareholder activism.

The main competing hypothesis for the value creation of hedge fund activism is that hedge fund activists only target undervalued companies and simultaneously inform markets about the true intrinsic value of the target, but not actually create value themselves. The positive market reaction happens then because of disclosure of new information that the hedge fund has found an undervalued company and not because it is believed that activist can add value with its intention to do reforms. This hypothesis is supported by the

finding from Brav et al. (2009) that hedge funds tend to target "cheap" value-companies with positive Fama-French HML factor. The third option is mixed explanation of these hypotheses: Activists target undervalued companies *and* are able to create value with their campaign. At least hedge fund activists themselves seem to believe strongly in this explanation. In their announcement of stock purchase they commonly state in the SEC filing that they believe that firm is undervalued. Their sometimes long and expensive campaign also signals about their own belief that they are making important and value-enhancing reforms to target company. If they did not believe in their own ability to create value to target firm they would just passively buy a stake from the company and wait for the market to correct the mispricing. However, they go through all the trouble which clearly illustrates that they do not believe that there is a mispricing or that it will correct itself without some actions. In the next section this study shortly describes what has been the public's view on hedge fund activism and what do is known about the impact of hedge fund activism on the long-term performance of target companies.

2.2 Long term effects and changes in firm's riskiness

Although there is evidence that market reacts positively to hedge fund activism, major policy makers fear that the intervention of hedge fund activist would make the company more fragile and risky. The assumption is that notorious activist intervention would sharpen the stock movements if there is a large power struggle between management or the board and the hedge fund activist. These concerns are supported by finding of Klein and Zur (2011) who noticed that one year after the SEC filing the unsystematic equity risk and asset risk (volatility of unlevered returns) had increased significantly compared to the control sample. In addition to volatility they also report negative effect to firm's following year profitability.

In addition to concerns about the increased riskiness of the target firm, there has also been concerns that despite positive short term returns there is an adverse effect on the performance in the long run[1] as Bebchuck et al. (2015) point out. The assumption is that after the positive short term returns there would be reversal and in the long run net effect from activism would be negative. Another concern is that positive returns will only stay as long as hedge fund activist is holding its stake in the company but after selling the shares the price would drop. In the newest- yet unpublished - paper of Brav et al. (2015) report that firms' profitability

[1] See, e.g., Kay, J. (2012). The Kay review of UK equity markets and long-term decision making. *Final Report*, *9*. Bratton, W. W., & Wachter, M. L. (2010). The case against shareholder empowerment. *University of Pennsylvania Law Review*, 653-728.

improves in the years following the intervention, which contradicts with the decreasing profitability reported by Klein and Zur (2006). They also find no evidence of the worsening stock performance.

3 Sample selection and data description

There is no one central database for hedge fund activists. Thus, the sample must be collected manually. Like the previous literature, this study defines hedge fund activism as a strategy in which a hedge fund purchases a 5 percent or greater stake in a publicly-traded company with the intention of influencing the firm's policies. (Klein & Zur, 2006) As previous papers, this study collects the dataset from SEC Edgar database. Hedge fund activists are identified using Schedule 13D filings of known hedge funds. The mandatory US federal securities law under Section 13(d) of the 1934 Exchange Act obligates investors to file Schedule 13D with SEC within 10 days of acquiring more than 5 %[2] of any class of securities of a publicly traded firm if they intend to influence the management of the company in any way.[3] Schedule 13D filing reveals the identity of the buyer, the target firm, the stake in the company, and the "purpose" for the purchase. (Klein & Zur 2006)

Occasionally, the activist has already been in contact with management via letters, which are attached to the Schedule 13D filing. In these letters activists raise their concerns about the situation of the company and in a friendly - or not so friendly - way request management or the board to make changes that they are seeking. The most hostile letters are accompanied with a threat or announcement of a proxy or other sort of action with purpose to supersede the current management or replace one or more board member with activist's own candidate. These objectives are also disclosed in the filing's Item 4: Purpose of the transaction, which requires the filer to declare its reasons for acquiring the shares, particularly if the intention is to engage in any sort of M&A activity, seek to liquidate company's key assets, seek a board representation or try to change the capital structure of the company. Ultimately by reading these items in each of the filing, it can be confirmed what is the objective of the buyer.

3.1 Sample Selection

The data collection is carried out through following steps: First, all the Schedule 13D filings from the years 2000 until 2011 are searched from SEC Edgar database. Second, a sample of hedge fund activists is construct.

[2] As Brav et al. (2008) noted given the amount of capital required to acquire 5% stake in a company, the Schedule 13D based search could bias the sample toward smaller targets although some hedge funds have engaged in activism with less than 5% stake in the target company.

[3] Passive investors who do not intend to influence the management need to file SEC filing of Schedule 13G.

This study searches all the hedge fund activists that had been most active in the past years from the Internet. It relies on several sources when identifying the activists. The sources are mainly websites of associations that provide financial information for various stakeholders.[4] They report to be offering these lists in order to inform and assist the learning of the hedge fund activism. Combining these lists a preliminary sample of 128 individual activist investors is construct. [5] Third, the hedge fund activist sample is cross-referenced with the data from SEC Edgar. From the Schedule 13D filings in 2000-2011, this study searches events in which a hedge fund from the sample has been the filer and thus gets a preliminary sample of target companies. By reading all the filings especially Item 4, it is confirmed that the hedge fund has an activist purpose.

After cross-referencing, this study gets a sample of 73 hedge fund activists that have directly - or under subsidiary company name - filed and Schedule 13D. 66 activists have done more than 1 filing and 11 funds have done 10 or more. Now, the initial deal sample constitutes from 320 unique deals. Few companies have been targeted by the same activist more than once but these later events are excluded because the first intervention of the activist is the moment when the activist starts its campaign. Events in which company is targeted later by another activist is also excluded.

After identifying target companies, the stock return performance is searched from The Center for Research in Security Prices (CRSP). For some companies, some data is missing mainly because they are trading in the Pink Sheets or OTC bulletin. The stock return data from these exchanges are not available in CRSP. The searched data is from January 1996 to December 2015 mainly because this study needs data four year before and after the event. Finally, the monthly stock return data for 215 unique target firms is found that constitutes the final sample.

A control sample for target sample is then constructed. By using SIC codes of the firms each company is matched with one of Fama - French 49 industry portfolios. Then the control industry portfolio's monthly returns is matched to the target firm's monthly returns using the same calendar month's data.

[4] The sources and comprehensive list of the initial hedge fund sample is presented in Appendix 1

[5] Although this is not a comprehensive sample, there is reason to believe this sample will capture the patterns of hedge fund activism as well as any comprehensive sample. One reason is because in Greenwood and Schor report that in their comprehensive sample from 1993 to 2006 there are 10 hedge funds (Farallon Capital, Steel Partners, VA Partners, Wynnefield, Blum Capital, Carl Icahn, Chapman Capital, Newcastle Partners, JANA, ThirdPoint, and Pirate Capital) that constitute over two thirds of their sample. These large activist hedge funds are present in the sample as well. Another reason is that some sources declare that their activist list is comprehensive. Although their statement cannot be verfied, and likely they are missing some activists as well, there is reason to believe by merging all these sources will produce fairly reliable list.

3.2 Descriptive statistics

3.2.1 Objectives of hedge funds

As recited earlier every filing is read through especially the Item 4: Purpose of transaction, which requires the filer to declare its reasons for acquiring the shares, particularly if the intention is to engage in any sort of M&A activity, seek to liquidate company's key assets, seek a board representation or try to change the capital structure of the company.

This study divides the activists' agendas into 5 groups that were also used with Brav et al. (2008). These categories are not mutually exclusive since some activists are campaigning for multiple reforms. As Table 1 shows the most common objective of the activist is the general undervaluation of the stock or the purpose to maximize shareholder value. With these events activist has stated that the purpose of the transaction is to engage with management in order to maximize shareholder value. They do not state any specific reform but apparently hope to be more involved with the decision making of the company. The other four objective categories are capital structure, business strategy, sale of target a company or one of its major assets and governance issues. The objective distribution differentiates from the sample of Brav et. al (2008). They report the General undervaluation to be 47.9% Capital structure 17.4%, Business strategy 23%, Sale of the target company 20.1% and Governance 52.1%

Greenwood and Schor (2009) also report a similar representation of objectives for their sample of hedge fund activism. Their reported numbers also differ. The shares of each objective in their sample are 44.7, 10.8, 13.7, 17.7 and 22.1% for each category respectively. More specifically what types of objectives has been included to each category are found in Table 1.

Table 1: Summary of hedge funds' stated objectives

This initial sample includes 320 events, which includes companies that have been targeted by multiple activists or same activist multiple times. This sample also includes companies that are listed in the Pink Sheet or OTC bulletin. However, this sample more accurately describes the true distribution of stated objectives of the whole hedge fund activist universe, than the final sample which only includes the companies that have data on stock returns. The table is self-constructed by reading the SEC Schedule 13D filing Item 4: Purpose of the filing where the filer announces in which way it intends to engage with the management. These objectives are sorted into five categories. If filer announces that it will specifically engage in any sort of activity or is concerned about any of the things listed under the category, it is added to the number of events in that category. Since the filer can have multiple stated objectives, the number of events in each category is not equal to sum of the events.

Objective Categories:	**Num. of Events**	**% of Sample**
1. General undervaluation / maximize shareholder value	**224**	**70.00 %**
2. Capital structure	**20**	**6.25 %**
- Excess cash, under-leverage, dividends repurchases		
- Equity issuance, restructure debt, recapitalization		
3. Business strategy	**32**	**10.00 %**
- Operational efficiency		
- Lack of focus. business restructuring and spinning off		
- M&A: as target (against the deal for better terms)		
- M&A: as acquirer (against the deal for better terms)		
- Pursue growth strategies		
- Hire an investment bank to search for strategic alternatives		
4. Sale of target company	**20**	**6.25 %**
- Sell company or main assets to a third party		
- Take control/buyout company and/or take it private		
5. Governance	**45**	**14.06 %**
- Rescind takeover defenses		
- Oust CEO, chairman		
- Board independence and fair representation		
- More information disclousure/potential fraud		
- Excess executive compensation/pay for performance		
Sum of categories	**341**	
Sum of deals	**320**	

3.2.2 Frequency of hedge fund activism

Table 2: The number of events in each year in the initial sample

This initial sample includes 320 events, which includes companies that have been targeted by multiple activists or same activist multiple times. This sample also includes companies that are listed in the Pink Sheet or OTC bulletin. This sample more accurately describes the true distribution of the number of events during the years 2000 to 2011 in the whole hedge fund activist universe, than the final sample which only includes the companies that have data on stock returns. The table shows in which year the hedge fund activist's SEC Schedule 13D filing was filed.

Year	Events
2000	9
2001	14
2002	16
2003	18
2004	25
2005	34
2006	35
2007	34
2008	37
2009	36
2010	28
2011	34
Sum	**320**

Table 2 provides descriptive statistics about frequency of events in each year for the initial sample. The frequency of activism filing has increased until 2008, which is in line with the previous studies from last decade (e.g., Brav et al. 2008, Greenwood and Schor 2007, and Klein and Zur 2006). However, after 2005 the increase in the number of events per year has more or less stabilized. One explanation for this might be linked to finding of Brav et al. (2008) who report diminishing announcement returns for hedge fund activists from 2000 to 2006. They suggest that activism is another sort of arbitrage that is driving down the returns as increasing number of activists are fighting for a limited amount of targets. This will eventually lead to disappearing of abnormal returns and to new equilibrium in the market. If their hypothesis is correct the frequency of activism should also stabilize to the new equilibrium, which can be seen in this data. The peak year of deals was 2008 and after that there has been a small depression. In 2011 the number of events is growing again. So, there seems to be a correlation with the frequency of activism and financial crisis. Whether there is also causality and what is the main driver of this inactivity could be a topic for further research.

3.2.3 Industries of the targeted firms

Table 3 shows the industries targeted by activists. The initial sample consist of firms that come from 37 of the 49 Fama-French industries. The five biggest industries targeted by hedge funds activists are financial services, retail, computer software, business services and electronic equipment and they make up almost half the total companies targeted. This differs somewhat from the sample of Klein and Zur (2006) who report that biggest industry for hedge fund activists is business services followed by pharmaceutical products, retail, restaurants & hotels and banks. A possible explanation to why financial services are the largest industry is provided by Kahn and Winton (1998) who suggest that investors are more likely to intervene in well-understood firms or industries so that the market can appreciate the effects of intervention. Hedge fund understand more about finance so they target more firms that offer financial services because they know the business model and what kind of reforms are needed. More accurate descriptions about Fama-French 49 Industry classifications and what is included in each portfolio can be found from Kenneth French's website or Faculty Directory of Berkeley-Haas. [6]

[6] Berkeley-Haas (2016, July 2) SIC codes. Retrieved from *http://faculty.haas.berkeley.edu/klee/Siccodes49.txt*

Table 3: Target firm distribution in industries in the initial sample

This initial sample includes 320 events, which includes companies that have been targeted by multiple activists or same activist multiple times. This sample also includes companies that are listed in the Pink Sheet or OTC bulletin. This sample more accurately describes the true target firm distribution in industries in the whole hedge fund activist universe, than the final sample which only includes the companies that have data on stock returns. The sample firms have been matched to Fama - French 49 industries using SIC codes. In the table you see how many targets come from each industry and how many percentage does that industry constitute from the total sample.

Fama French Industry classification	Num. Of Firms	% of Total
Aero	1	0,31 %
Autos	3	0,94 %
Banks	12	3,75 %
BldMt	4	1,25 %
Books	4	1,25 %
BusSv	31	9,69 %
Chems	4	1,25 %
Chips	20	6,25 %
Clths	4	1,25 %
Coal	2	0,63 %
Drugs	15	4,69 %
ElcEq	4	1,25 %
Fin	38	11,88 %
Food	1	0,31 %
Fun	8	2,50 %
Gold	1	0,31 %
Hardw	3	0,94 %
Hlth	8	2,50 %
Hshld	4	1,25 %
Insur	5	1,56 %
LabEq	5	1,56 %
Mach	8	2,50 %
Meals	10	3,13 %
MedEq	10	3,13 %
Oil	5	1,56 %
Paper	2	0,63 %
PerSv	5	1,56 %
RlEst	6	1,88 %
Rtail	31	9,69 %
Soda	1	0,31 %
Softw	33	10,31 %
Steel	2	0,63 %
Telcm	10	3,13 %
Trans	4	1,25 %
Txtls	2	0,63 %
Util	4	1,25 %
Whlsl	10	3,13 %
Sum	**320**	**100 %**

3.2.4 Raw return analysis

Based on the data received from CRSP the initial raw returns analysis is done about the long term effects of activist filing and how the companies have performed before. The monthly cumulative returns is calculated for companies that possess return information 48, 36 or 12 months before and after the activist Schedule 13D filing.

With the methods, these six time periods are used that offer perspective on how the returns have developed in different time periods. For example, [-48, -1] means monthly returns from 48 months before the filing to 1 month before. Similarly, [1,12] represents returns from 1 month after filing to 12 months forward. T=0 represents month of the filing date. This month is excluded so that the announcement effect of activist filing does not bias the long-term analysis. There might be some leakage effect even after the filing month (T=0) meaning that it takes more than one month for the markets to fully understand the new information from activist intervention but since this leakage is minimal it is ignored as the previous studies (Brav et al. 2015) have done.

Table 4: Cumulative returns before and after the activist intervention

The table cumulative returns before and after the SEC Schedule 13D filing in different time periods. "Month" presents the window of which the returns are being investigated. The filing month is 0 and thus it is excluded from all the time windows. "Target Firm" or "Control Industry" columns show the results of target firm of activist of the specific control industry matched using Fama - French 49 industry portfolios. "N" presents number of firms in the specific period.

Month	**[-48,-1]**		**[-36,-1]**		**[-12,-1]**		**[+1,+12]**		**[+1,+36]**		**[+1,+48]**	
	Target Firm	**Control industry**	**Target Firm**	**Control industry**	**Target Firm**	**Control industry**	**Target Firm**	**Control industry**	**Target Firm**	**Control industry**	**Target Firm**	**Control industry**
Median	-5.6 %	25.5 %	-5.5 %	22.7 %	-3.1 %	17.9 %	19.3 %	16.0 %	35.6 %	37.7 %	58.9 %	48.6 %
Average	39.5 %	27.7 %	27.4 %	22.7 %	11.8 %	20.7 %	18.0 %	16.6 %	53.9 %	33.2 %	68.6 %	47.7 %
Standard deviation	1.55	0.44	1.44	0.44	0.71	0.36	0.56	0.34	1.02	0.45	1.21	0.51
N	165	165	179	179	215	215	169	169	122	122	105	105

Even though cumulative average returns for 3 and 4 year period before filing have been larger than in control sample, the median for targeted companies have been lower for 4 year, 3 years and 1 year before filing. So, it seems that sample contains companies that have performed well before the filing but in this case more informative median implies that at least half of the companies are losing their value already 4 years ahead.

For the previous 12 months returns the control sample average is also higher than target sample. This might suggest that even the better performing companies are losing their advantage 12 months before or that some companies have performed very badly, which is pulling down the average. All in all, these findings suggest that hedge funds tend to target companies that have performed poorly. This is in line with the findings of Greenwood and Schor (2006) who also report underperformance relative to industry. These results are also consistent with Bethel et al. (1998) and Becht et al. (2006) who found that activism targets underperforming firms with the intention of increasing shareholder value. Years after the Schedule 13D filing the returns have increased substantially. It also seems that these above industry returns persist for a long time.

However, there are two sorts of survivorship bias that are distorting the results. When looking at historical returns far - for example 4 years - before the SEC filing, it must be noted that these companies are selected to the sample *because* they are targeted by activist after 4 years so they must survive until that moment. The bias does apply to after the filing returns as well, if the company goes bankrupt, is sold or delisted it drops from the sample.

4 Methodology and results

4.1 Effect of hedge fund activism on volatility of the target firm

In order to see how the activist intervention has effected the overall riskiness this study calculates the percentage change in volatility between before and after the Schedule 13D filing and then compare it to a control sample. For every observation, this study calculates the volatility before the filing and then compares that with the volatility of the same time period after the filing for the same stock. If there is not return information for the same period before and after the filing, the company is excluded from the sample. This unfortunately diminishes the sample size especially with the longer periods. This study calculates the change in volatility for 12, 36 and 48 month periods. With the 12 month change I hope to capture the immediate effect of activism and with 36 and 48 month changes prove whether target companies have transformed into riskier companies for good.

It is necessary to calculate this proportionately because the control sample is an industry portfolio and so it offers automatically some diversification benefit and lower volatility. To be able compare these numbers proportionate changes must be used to see which volatility has increased more. Proportionate changes and the results of standard t-test are shown in Table 5.

The volatility has risen for the target firm and for the control industry in all periods. The table indicates that during 12 month period the volatility of the target firms has risen more than the industry volatility during that time period. In longer time samples, it varies which volatility change is larger the industry's or the firm's. None of these results indicate statistical significance. So, it seems that this study cannot draw any conclusions that activist intervention is in any way linked to the increased volatility. The more plausible explanation is that the company volatility has increased with the industry and the market. This is supported by the fact that market volatility has increased during the sample period, which is shown as an increase in the industry volatilities. Next, this study investigates whether activist intervention affects the long-term performance of the target firms.

Table 5: Change in the volatility of the target firm after the activist intervention

Table presents how many percentages hedge fund target firms' and control industries' volatilities have increased on average after the SEC Schedule 13D filing. Different time periods show what is the time window that is being investigated e.g. the results from 12 month show how much 1 year volatility has increased proportionally compared to 1 year period before the activist filing and 36 and 48 months presents volatility change with longer period 3 and 4 year periods. "T-value for differences in the mean" shows t-statistics for average differences.

Change in volatility (Δ σ)	Hedge Fund Target Firm Mean	Control Industry Mean	T-value for differences in the mean	Pearson Correlation	Observations
12 month	0.103	0.084	0.371	0.452	151
36 month	0.052	0.091	-0.626	0.618	89
48 month	0.078	0.022	0.634	0.528	73

*** significant at the 1% level; ** significant at the 5% level ; * significant at the 10% level

4.2 Effect of hedge fund activism on target firm's long term returns

Based on the preliminary analysis of raw returns in Table 4, it seems that after the activist intervention the performance of target companies has improved and these high returns persist for a long period of time.

Next, this study tests whether these returns have outperformed their peers in risk-adjusted basis and whether target companies have produced abnormal returns after the activist intervention. This study measures the effects of activist filing to target firms' long term returns using two methods. First, it calculates the Buy-and-Hold Abnormal Returns (BHAR) compared to a control sample and second, it uses a calendar-time portfolio analysis (CTIME) to see if trading strategy of investing after the activist announcement and held the stock for specified period, would have yielded abnormal returns. Both methods are standard approaches that are commonly used by financial economists for detecting underperformance relative to the

risks involved. In hedge fund activism context, the first approach was used by Klein and Zur (2006), who calculated 1 year BHAR. This study wants to focus on the long-term effects and therefore include 3 and 4 year horizons as well. Bebchuck et al. (2015) also used these methods in their comprehensive sample from 1994 to 2011.

4.2.1 Buy-and-Hold Abnormal Returns

Average BHAR is a measure of abnormal returns. It is defined as the difference between the realized buy-and-hold return and the normal buy-and-hold return. The realized buy-and-hold return is the cumulative return from the target company and the normal buy-and –hold return is the control industry's cumulative return. Table 6 presents the buy-and-hold abnormal returns for each time period. Again the periods have been divided into six categories based on the distance from the event month. Welch t-tests is run for different periods of time to see if there is statistical significance in any period. The reason this study uses Welch t-test with unequal variances is because the control industry returns have significantly lower standard deviation than the target firm. The reason for lower volatility is due to the diversification benefit that the industries get relative to individual firms. The results of the Welch t-test and normal t-test are shown in Table 6.

Table 6: Average Buy-and-Hold Abnormal Returns

Table presents cumulative returns of hedge fund target firms and their control industries. It also presents average abnormal return of the target firms in different time windows. "Hedge fund Target Firm Mean" present average realized buy and hold return of the target. "Control industry Mean" present average realized buy and hold return of the control industries. The results are shown as (1+ Cumulative return). "Average BHAR" is the difference between the cumulative return from the target company and the cumulative return of the control industry. "Month" presents the window of which the returns are being investigated. The filing month is 0 and thus it is excluded from all the time windows. "Standard deviation" is the standard deviation of the abnormal returns. "T-value for differences in the mean (unequal)" presents the t statistic from Welch t-test that assumes unequal variances. "T-value for differences in the mean (equal)" presents t statistic from normal t-test that assumes equal variances.

Month	Hedge Fund Target Firm Mean	Control Industry Mean	Average abnormal return	Standard deviation	T-value for differences in the mean (unequal)	T-value for differences in the mean (equal)	Observations
[-48,-1]	1.40	1.28	0.12	1.52	0.94	1.00	165
[-36,-1]	1.27	1.23	0.04	1.38	0.42	0.45	179
[-12,-1]	1.12	1.21	-0.09	0.72	-1.64	-1.81*	215
[+1,+12]	1.18	1.17	0.01	0.55	0.27	0.32	169
[+1,+36]	1.54	1.33	0.21	1.06	2.05**	2.15**	122
[+1,+48]	1.69	1.48	0.21	1.15	1.62	1.86*	105

*** significant at the 1% level; ** significant at the 5% level ; * significant at the 10% level

The initial results show that the target firms have outperformed their peers in all the periods besides the 12 month period before the targeting. This in line with findings of Brav et al. (2008) but contradicts with the findings of Klein and Zur (2006) who report that activists are mainly targeting healthy well performed firms.

The results from Welch t-test are statistically significant in [+1, +36] period. This is quite interesting. One would assume that the biggest abnormal returns would occur after the first year of the filing but it seems that there are significant returns to be made also in second and third year. This supports the theory that an activist is able to actually increase the long term returns of target companies and that these effects are not captured in the announcement return. It could be that one year is too short period of time to reorganize a badly managed company and the results of activism are gained later when the activists push to sell the then-more-valuable company or just sell their stake and profit from increased share price. Indeed, Brav et al. (2008) have reported that activist holding period is actually longer than expected –almost 2 years.

For the [-12, -1] period for target sample's returns are somewhat smaller than control industry's and in [+1, +48] period target firm returns are also larger – probably mainly due to the same effects as in [+1, +36]. But these periods don't quite reach the limits of statistical significance - at least based on Welch t-test.

However, there are few shortcomings with this method that must be addressed. Firstly, industry portfolio might not be the best control sample to be used as a normal buy-and-hold return. Previous literature (Brav et al. 2008) have shown that many activist target mainly small companies. The industry portfolio offers the comparison as an average company, but it does not capture the risk factor of small firms. However, the SMB factor is taken into account when later this study regresses target firm portfolio returns using the standard asset pricing models. Another shortcoming is due to a survivorship bias. The sample size diminishes with time. At the end of fourth year over half of the sample firms have dropped out. This can be due to a few things. Either companies perform so badly that they go bankrupt or they are bought out or delisted. Thus, this analysis does not capture all of the bad performing companies. Of course this bias works in both ways, there are probably successful mergers or acquisitions that happen during the course of the year and offer large acquisition premium to target company shareholders but since this study only monitors the performance after a whole year, these events are not captured in the analysis either. However, in the following method this is not an issue

4.2.2 Calendar –time Portfolio Analysis

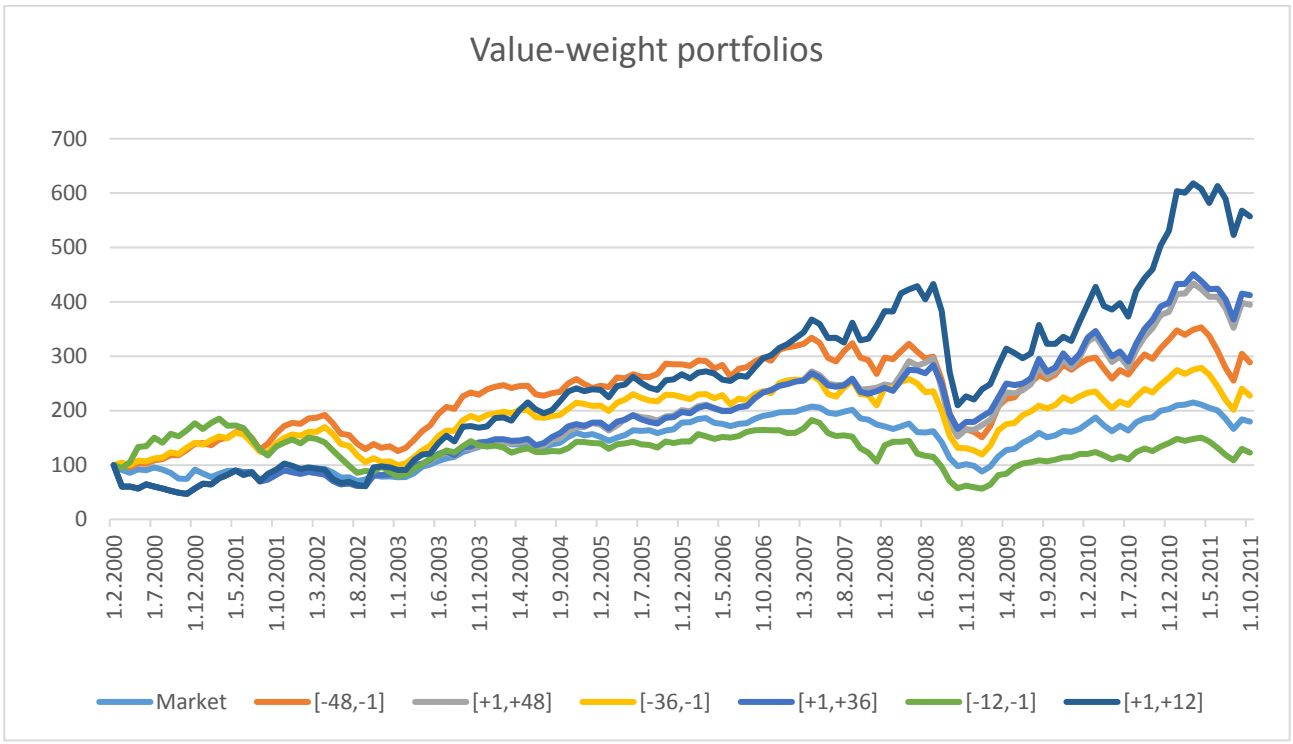
With this method, tis study calculates calendar-time portfolio regressions which is the same method that Bebchuck et al. (2015) have used in their study. The method is also known as CTIME method or Jensen-alpha approach. [7] Some academics suggests that this is the preferred method when calculating long-term abnormal returns. For example, Fama (1998) argues that the BHAR approach does not adequately control cross-sectional correlation among individual firms, while statistical advantage of CTIME is that it uses a time-series of portfolio returns. The portfolio variance includes the cross-correlations of firm abnormal returns and the cross-sectional dependence issue is eliminated (Lyon, Barber and Tsai, 1999).

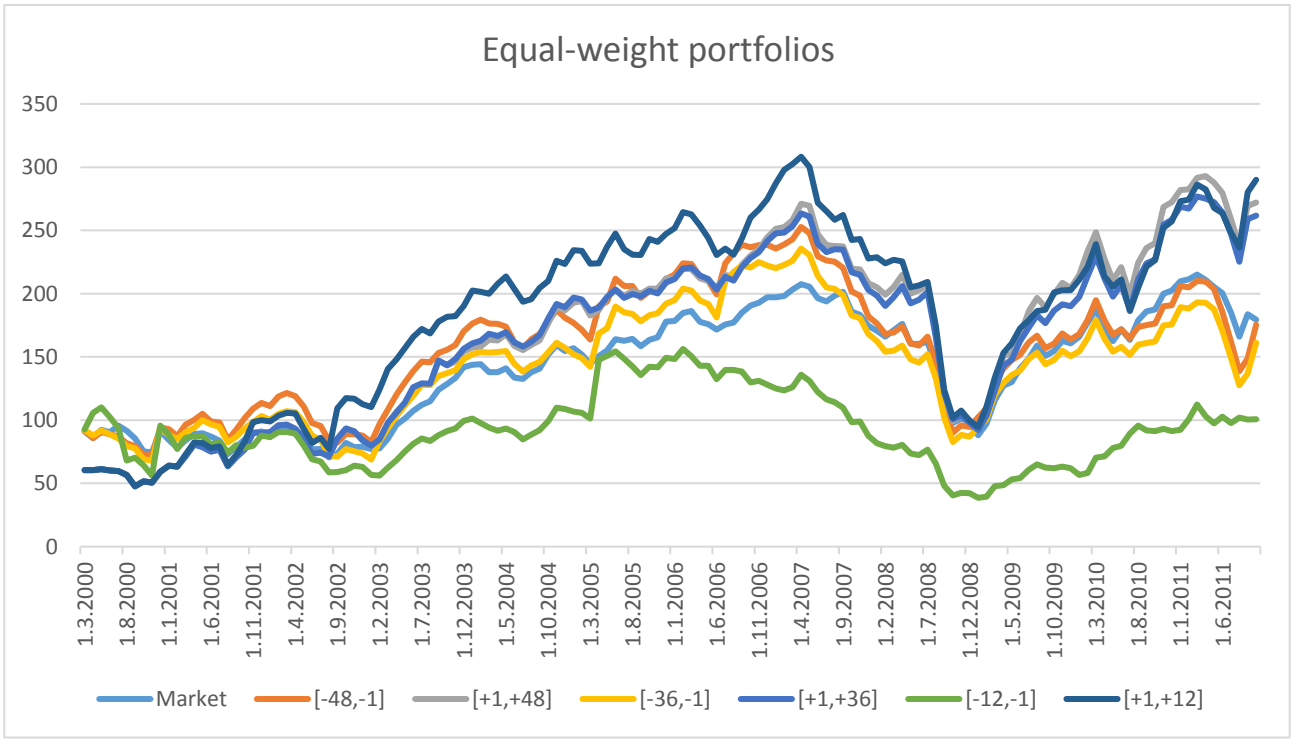
In this method, targeted firms are grouped in portfolios that are traded in calendar time and the portfolios' abnormal performance is then estimated using three standard asset pricing models. This study forms 6 portfolios in which portfolio companies are sold one month before the activist filing or bought one month after activist filing. For example, [-48, -1] portfolio beginning in January 1996 and ending December 2015 is formed by buying all firms that are about to be targeted by activist within 4 years and the firms are held until 1 month before filing of Schedule 13D. Similarly, a [+1, +48] portfolio is formed by buying the firm in the beginning of the month following the intervention and holding 4 years or until the firm is sold, delisted or filed a bankruptcy. This study forms both equal-weight and value-weight portfolios. In the value-weight portfolios, it uses market capitalization of each company as weights. Market capitalization is calculated by multiplying the month's number of shares outstanding with company's share price.

The Figure 1 visualize the effectiveness of different portfolios. The time period is starting from 2/2000 and continuing to 11/2011 which was the period in which all the six portfolios were trading. The both graphs clearly illustrate how the post-event portfolios have outperformed the pre-event portfolios. The graph also clearly illustrates that after the financial crisis the target firms haven't experienced worse performance than before it, and activist targets have in fact revived rather quickly from the events of 2008.

[7] Event Study Metrics (2016, July 15) Long-term event studies and the calender-time portfolio approach. Retrieved from *http://eventstudymetrics.com/index.php/long-term-event-studies-and-the-calender-time-portfolio-approach/*

Figure 1: Cumulative calendar-time portfolio returns





This study runs regression for all the portfolio excess returns using Capital Asset Pricing Model (CAPM), Fama-French- Carhart 4-factor model (FFC4) and the most recent Fama-French 5-factor model (FF5)[8] that adds the profitability factor (RMW) and investment factor (CMA) into a three factor model. Five-factor -model does not include the momentum factor (MOM).

Since the number of events in sample increases, this study estimates regression coefficients using weighted least square estimator in which number of events in a given calendar month is used as weights. Months that have less than ten events are also excluded, which shrinks the number of observations but offers a more reliable picture of tradable portfolio.[9]

[8] There hasn't been paper that uses FF5-factor model in hedge fund activism but this study includes it since it could provide new additional information about target firm characteristics. As Fama and French (2015) explain, basically these new risk-factors replace the HML factor because all the all variation in HML factor is captured by profitability and investment premium and they provide more specific information about the factors that affect the asset's returns. Still, the HML factor is kept as a variable in the model although it is redundant because according to Fama and French including it does not impair the model. The redundancy of HML can be observed for example by comparing the FFC4 and FF5 models in Table 8 in which former presents statistically significant results and latter does not since the variation is shown instead in CMA and RMW factors.

[9] The OLS regression produce similar results but the R squared is much lower relative to WLS estimator. This implies that OLS is worse fit than WLS. The results from OLS regressions is found in Appendix B.

Table 7: Long term abnormal return analysis of Calendar – time portfolios using WLS regressions

The table reports statistics on long-term abnormal returns associated with hedge fund activism. Panels A and B report regression estimates and their t-statistics in parentheses from equal- and value-weighted calendar-time portfolio regressions. "Month" indicates the buying time relative to the event (activist filing Schedule 13D) and the holding period in months. "Model" indicates the asset pricing model used where "CAPM" is Capital Asset Pricing Model , "FFC4" is Fama-French-Carhart" 4-factor model and "FF5" is Fama-French 5-factor model. "Alpha" is the estimate of the regression intercept from the factor models. "Beta" is the factor loading on the market excess return (the Fama and French RMRF). "SMB," "HML," "RMW," "CMA," and "MOM" are the estimates of factor loading on the Fama–French size, book-to-market, profitability and investment factors, and the Carhart momentum factor. *, **, and *** indicate statistical significance at the 10, 5, and 1% levels.

PANEL A: Equal-weight portfolios

Month	[-48,-1]	[-48,-1]	[-48,-1]	[-36,-1]	[-36,-1]	[-36,-1]	[-12,-1]	[-12,-1]	[-12,-1]	[+1,+12]	[+1,+12]	[+1,+12]	[+1,+36]	[+1,+36]	[+1,+36]	[+1,+48]	[+1,+48]	[+1,+48]
Model	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5
Alpha	0.002	0	-0.002	0.003	0	0	-0.004	-0.007	-0.006	0.005	0.006	0.006	0.006	0.006	0.007	0.006	0.006	0.007
	[0.605]	[0.006]	[-0.498]	[0.616]	[0.103]	[-0.112]	[-0.995]	[-1.918]*	[-1.623]	[1.455]	[1.55]	[1.578]	[2.277]**	[2.185]**	[2.37]**	[2.129]**	[2.15]**	[2.55]**
Beta	0.011	0.008	0.01	0.011	0.007	0.009	0.011	0.009	0.009	0.013	0.012	0.013	0.013	0.012	0.012	0.013	0.012	0.012
	[13.46]***	[9.994]***	[10.434]***	[12.081]***	[8.305]***	[8.56]***	[12.964]***	[9.307]***	[8.32]***	[16.844]***	[13.16]***	[11.842]***	[21.512]***	[16.47]***	[14.699]***	[22.279]***	[17.086]***	[15.142]***
SMB		0.802	0.816		0.755	0.721		0.84	0.816		0.144	0.108		0.338	0.308		0.315	0.257
		[7.926]***	[6.807]***		[6.259]***	[5.026]***		[5.56]***	[5.167]***		[0.857]	[0.616]		[2.667]***	[2.341]**		[2.626]***	[2.065]**
HML		-0.098	-0.054		-0.175	-0.071		-0.081	0.004		-0.249	-0.142		-0.079	0.035		-0.002	0.155
		[-1.046]	[-0.369]		[-1.6]	[-0.422]		[-0.614]	[0.027]		[-1.541]	[-0.789]		[-0.661]	[0.262]		[-0.021]	[1.216]
RMW			0.232			0.102			-0.186			-0.129			-0.201			-0.348
			[1.269]			[0.475]			[-0.786]			[-0.496]			[-1.054]			[-1.906]*
CMA			-0.156			-0.149			-0.176			-0.188			-0.216			-0.27
			[-0.817]			[-0.658]			[-0.759]			[-0.682]			[-1.044]			[-1.345]
MOM		-0.285			-0.313			-0.183			-0.179			-0.134			-0.156	
		[-5]***			[-4.791]***			[-2.577]***			[-2.333]**			[-2.336]**			[-2.814]***	
R squared	0.523	0.679	0.636	0.482	0.62	0.566	0.57	0.669	0.654	0.694	0.711	0.7	0.753	0.771	0.766	0.752	0.773	0.768
Observations	167	167	167	159	159	159	129	129	129	127	127	127	154	154	154	166	166	166

PANEL B: Value-weight portfolios

Month	[-48,-1]	[-48,-1]	[-48,-1]	[-36,-1]	[-36,-1]	[-36,-1]	[-12,-1]	[-12,-1]	[-12,-1]	[+1,+12]	[+1,+12]	[+1,+12]	[+1,+36]	[+1,+36]	[+1,+36]	[+1,+48]	[+1,+48]	[+1,+48]
Model	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5
Alpha	0.006	0.003	0.001	0.004	0.002	0.001	-0.004	-0.006	-0.006	0.012	0.011	0.017	0.011	0.01	0.012	0.009	0.009	0.011
	[1.721]*	[1.018]	[0.412]	[1.19]	[0.531]	[0.211]	[-0.741]	[-1.16]	[-1.242]	[2.08]**	[1.94]*	[2.935]***	[3.342]***	[3.211]***	[3.71]***	[3.18]***	[3.087]***	[3.694]***
Beta	0.01	0.009	0.011	0.01	0.009	0.01	0.012	0.01	0.011	0.011	0.009	0.007	0.011	0.009	0.009	0.011	0.01	0.009
	[14.512]***	[11.816]***	[12.105]***	[13.313]***	[10.629]***	[10.282]***	[11.213]***	[8.313]***	[7.773]***	[9.707]***	[6.646]***	[4.703]***	[15.386]***	[11.8]***	[9.991]***	[17.353]***	[13.545]***	[11.639]***
SMB		0.435	0.527		0.384	0.452		0.51	0.55		0.783	0.609		0.649	0.606		0.585	0.538
		[4.212]***	[4.601]***		[3.184]***	[3.383]***		[2.497]**	[2.643]***		[3.185]***	[2.508]**		[4.718]***	[4.348]***		[4.535]***	[4.129]***
HML		0.22	0.133		0.243	0.21		0.032	0.112		-0.327	-0.052		-0.314	-0.172		-0.262	-0.098
		[2.289]**	[0.94]		[2.225]**	[1.337]		[0.181]	[0.513]		[-1.388]	[-0.207]		[-2.424]**	[-1.218]		[-2.128]**	[-0.738]
RMW			0.37			0.252			0.181			-1.224			-0.379			-0.396
			[2.123]**			[1.26]			[0.582]			[-3.417]***			[-1.88]*			[-2.075]**
CMA			-0.061			-0.102			-0.364			-0.276			-0.33			-0.41
			[-0.334]			[-0.481]			[-1.188]			[-0.723]			[-1.502]			[-1.95]*
MOM		-0.108			-0.074			-0.081			-0.189			-0.076			-0.067	
		[-1.858]*			[-1.139]			[-0.847]			[-1.692]*			[-1.216]			[-1.116]	
R squared	0.561	0.619	0.623	0.53	0.574	0.577	0.497	0.526	0.53	0.43	0.482	0.517	0.609	0.665	0.673	0.647	0.691	0.701
Observations	167	167	167	159	159	159	129	129	129	127	127	127	154	154	154	166	166	166

The table provide so much information that this study will go systematically through the main findings and then focuses more on interpreting the risk factors in each table.

Again, the main focus are the alphas since this study wants to see if there is a significant improvement in returns after the intervention. The portfolios in pre-event window obviously are not tradable strategies, but they offer an interesting comparison to post event portfolios. The interpretation from both tables is that after activist intervention the alpha turns positive and significant. In the equal-weight portfolios the monthly alpha after the event is almost consistently 0.6% with different asset-pricing models and with different periods. In the value-weight portfolios, the regression indicates around 1.1% of abnormal return.[10] Also, it seems that 12 months before the filing the companies are performing worst. This result also supports the understanding that activists seem to target firms that are underperforming and after hedge fund intervention the firms start performing better - even when the announcement effect of the filing month is excluded. What is significant from what was known so far is that the highest alphas are achieved in the long horizon portfolios. This is the case for both value- and equal-weight portfolios. These findings with results from BHAR analysis are strong evidence against the hypothesis that firms' long term performance suffer if hedge fund activist starts its campaign. It also suggests that after activist filing the firms are able continually improve their performance. If activists would just target undervalued companies, one would rationalize that any mispricing or leakage effect would be fully satisfied within one year. The fact that the performance just keeps getting better could suggest that reforms that the activists execute are paying off in the long term and the market is adjusting the stock price later as the company is continually presenting good news.

When this information is added to what is known about hedge fund activist's holding periods, it seems that firms' returns stay high even when activist may have sold its stake. Bebchuck et al. (2015) tested this and found results that suggest that alpha stays positive even after hedge fund's exit. Another more negative interpretation is that hedge fund activist being involved in a well performing company is holding back the company and after activist exits the company is able to reach its true potential. This is unlikely since then it would be preferable for activist to just transform into a passive shareholder and enjoy the returns that the management is able to produce. In any case, this is difficult to test and it is not the purpose of this paper, thus this study leaves that question open for further research.

[10] As Bebchuck et al. (2015) noted, even though alphas are statistically significant it is now well-known in the financial economics literature (Fama, 1998) that the standard error of the average of the estimated alphas understates the unobserved variability in performance, and the reported t-stats should thus be treated as merely suggestive.

Next, this study takes a closer look on the risk factors in each portfolio and what might cause these high returns. Both Panels A and B show that the target firms strongly correlate with market factor and the size premium, which is in line with previous findings that the hedge fund activists mainly target small firms. There is also a strong negative correlation with momentum factor. It is larger for equal- than value-weight portfolios, which suggests that phenomenon applies to all companies in the sample, - not just the larger ones. These results are also consistent with results of Bebchuck et al. (2015). The negative momentum factor could be explained by the turnaround that happens before the filing when companies that have generated good returns suddenly start performing badly as well as after the filing when underperformed companies start producing good returns due to activist involvement. It seems that effect diminishes when moving from pre-event portfolios to post-event portfolios.

In addition to significance of momentum, The FFC4 regressions in PANEL B indicates about the significance of HML factor. The fact that the results are only observed in the value-weight portfolios could mean that the sample contains few big companies that are especially exposed to value premium. Unlike Brav et al. (2008) who find a positive value premium before and after the event, these findings show that value premium actually turns from positive to negative after the activist intervention. This could be explained if the high returns in the following years after the intervention increase the market value so much that the firms transform from value firms into a growth firms, - measured by Book-to-Market ratio.

The additional asset pricing model the Fama-French 5-factor model also helps to answer to this question. The risk premium behind HML factor can be explained by the investment and profitability factor. By looking at the regression results from left to right, it is notable how the RMW factors also turn from positive to negative and CMA factor gets more negative. Based on the results of Fama and French (2015) this is the explanation behind the change in value factor. These findings suggest that before the activist intervention target companies behave like companies that have robust profitability and pretty standard investment activity. However, after activist intervention the target firms correlate with portfolio that have weak profitability and invest aggressively. It is unclear do the target companies act in this way themselves. If yes, then that would suggest that returns have increased despite the low profitability and aggressive investments. Of course, the aggressive investments for these companies can also be value improving if there are much fruitful opportunities available. One explanation is that on the contrary to understanding that hedge fund is trying to stop management from doing value-destructing investments, it is actually pushing the management to do necessary investments that the firm needs to do in order to survive. As for the profitability, there is not much evidence of long term profitability of target firms. Bebchuck et al. (2015) report that in their sample ROA and Tobin's Q increased during the following 5- year period after the event but both remained

under industry average level. As noted earlier there are also contradictory results whether the operating profitability increases or decreases within 12 months after the filing which leaves an open question about impact of activism on firm's operating profitability. RMW factor in PANEL B suggest correlation with firms of low operating profitability is especially high in the following year of the event. However, this study recommends caution with this specific result because Fama (2015) warns that they calculate their numbers for operating profitability portfolios in a way that are likely to be at least 6 months old, thus the significance in RMW factor for [+1, +12] portfolio might be due to an extremely bad performance in the previous year. All in all these results suggest that target firms' returns cannot be easily explained by standard asset pricing models.

5 Conclusion

The purpose of this bachelor's thesis is to analyze how target companies of the hedge fund activists perform in the long term and what is the effect of the hedge fund activism on target firm's overall riskiness. This study empirically investigates the beliefs that hedge fund activists raise volatility of their target companies and adversely affect the long term returns of the companies. This paper provides investigation for both of these claims and finds that neither is supported by the data. Additionally, this paper contributes to academic debate about what is the value-creation ability of hedge fund activists and finds results that imply that hedge funds activists are actually able to do value-enhancing reforms that are paying off in the long term.

215 activism events are examined from the year 2000 to 2011 with a hand-collected dataset from SEC Edgar database. This study finds out that target companies are usually performing worse than their peers for 3-4 years before the event but significantly worse in the year prior to the intervention. In order to test the hypothesis whether hedge fund activist makes target firm more unstable and risky, this study tests how has the medium term (1 year) and long term (3-4 years) volatility of the target firm increased relative to its peers. It finds no evidence that the target companies perform worse than their control industries.

In addition, this study tests hypothesis that filing month announcement returns are reversed in the long term and target firms perform worse in the long term than what would be expected of them. Two standard approaches Buy-and-Hold Abnormal Return –method and Calendar –time portfolio analysis are used but no evidence of underperformance in the long term is found. On the contrary, it

seems that target firms are able to produce abnormal returns especially in the long horizon. It also finds that before the intervention target firms mainly correlate with small value firms which is consistent with findings of Brav et al. (2006) and Greenwood and Schor (2005). But inconsistent with previous findings is that in this sample the value premium actually flips negative after activist intervention, - possibly due to an increase in market capitalization and decrease in Book-to-Market ratio. Also, the target firms seem to correlate negatively with investment and profitability factors in post-event years, which partly imply consistence with results of Klein and Zur (2006) around operating profitability. However, with this finding alone this study cannot draw any further conclusions but target firms' long term investment policy and profitability definitely needs to be addressed by further research.

The results concerning the positive alpha in later years are mostly in line with Bebchuck et al. (2015) who do not find long term underperformance in their sample and partly in line with Greenwood and Schor (2007) who find over performance in their calendar-time analysis for 2-year window with equal-weighted portfolios but negative alphas with value-weighted portfolios.

This study provides two practical implications. Firstly, these findings provide useful information for policy makers around shareholder activism. They should not restrict shareholder involvement in companies' management on the basis of increased riskiness or harmful effect on long term returns. Secondly, the results also provide practical information for investors and company management about effects of hedge fund activism and the value creation ability of these investors. For management this information may prove to be valuable when considering how to react to a possible activist campaign.

Appendix 1: List of hedge fund activist

Barington Capital Group
Baupost Group
Blue Clay Capital Management
Blue Harbour Group
BlueMountain Capital
Blum Capital
Bolloré Group
Breeden Capital Management
Brett Icahn
Bryant Riley
Buffett Partnership Limited
Bulldog Investors
Cannell Capital
Carl Icahn
Cartica Management
Casablanca Capital
Cevian Capital
Chapman Capital
CIAM
Clay Lifflander
Clinton Group
Corvex Management
Costa Brava
Crescendo Partners
Dalton Investments (Japan)
Discovery Equity Partners
Dr. Joseph Mark Mobius
Ed Bosek
Elliott Associates
Elliott Management Corporation
Engaged Capital
Engine Capital
ESL Investments
Farallon Capital
Firebrand Capital
FrontFour Capital
Gamco Investors
Glenn Greenberg
Glenn J. Krevlin
Graham-Newman Corporation
Greenlight Capital
Gregory Taxin
H Partners Management
Harbinger Capital
Icahn Associates Corp.
Ironfire Capital
Jana Partners
John S. Dyson
Knight Vinke Asset Management
Knightspoint
Lawndale Capital
Legion Partners
Liberation Investment
Lion Fund
Lion Point Capital
Locksmith Capital
Loeb Arbitrage
Lone Star Value Management
Marcato Capital Management
Mario D. Cibelli
Mario J. Gabelli
Max Holmes
MFP Investors
MHR Fund Management
MMI Investments
Monarch Activist Fund
Nanes Balkany Partners
Nelson Peltz
New Mountain Capital
Newcastle Capital
Nierenberg Investment
Obrem Capital
Oliver Press Partners
Owl Creek
Perry Capital
Pershing Square Capital Mgmt
Peter Schoenfeld
Pirate Capital
Polygon Investment Partners
Quantum Pacific Capital
QVT Financial
Ramius Capital
Red Mountain Capital Partners
Relational Investors
Richard Breeden
Richard Rofe
Rick Barry
Riley Investment Management
RLR Capital
SAC Capital
Sachem Head Capital Management
Sandell Asset Management
Sarissa Capital Management
Shamrock Activist Value Fund
Sherborne Investors Management
SpringOwl Asset Management
Standard General
Stanley P. Gold
Starboard Value
Steel Partners
Steel Partners (Japan)
Stephen A. Schwarzman
Strategic Turnaround Partners
Sun Capital
T. Boone Pickens
TCI Fund Management
The Yucaipa Companies
Third Point
Thomas R. Hudson Jr.
TPG-Axon Capital Management
Tracinda Corporation
TRB Advisors
Trian Fund Management
VA Partners
ValueAct Capital Management
Wattles Capital
West Face Capital
Western Investment
Whitney Tilson
William Edwards
Wintergreen Advisers
Voce Capital Management
WSD Capital Management
Wynnefield Capital

The sources that this study has relied on are:

Carried Interest (2016) Top Activist Investors. Visited June 15th 2016. Retrieved from *https://www.carriedin.com/activist-investors/*

Hedge Fund Solutions (2008, August 26) The Official Activist Investing Blog ™. Visited June 15th 2016. Retrieved from *http://activistinvesting.blogspot.fi/2008/08/list-of-top-50-activist-hedge-funds.html*

HedgeTracker (2015) Top Shareholder activist Investors. Visited June 15th 2016. Retrieved from *http://www.hedgetracker.com/top_shareholder_activist_investors.php*

Appendix 2: Cumulative calendar-time portfolio returns

Table 9 presents the result from the regression using OLS estimator. The sample sizes are larger since here the months that have under 10 events are not excluded. Instead the R squared is lower compared to WLS. Otherwise OLS estimator produce similar results as WLS.

Table 8: Long term abnormal return analysis of Calendar – time portfolios using OLS regressions

The table reports statistics on long-term abnormal returns associated with hedge fund activism. Panels A and B report regression estimates and t-statistics from equal- and value-weighted calendar-time portfolio regressions. "Month" indicates the buying time relative to the event (activist filing Schedule 13D) and the holding period in months. "Model" indicates the asset pricing model used where "CAPM" is Capital Asset Pricing Model , "FFC4" is Fama-French-Carhart" 4-factor model and "FF5" is Fama-French 5-factor model. "Alpha" is the estimate of the regression intercept from the factor models. "Beta" is the factor loading on the market excess return (the Fama and French RMRF). "SMB," "HML," "RMW," "CMA," and "MOM" are the estimates of factor loading on the Fama–French size, book-to-market, profitability and investment factors, and the Carhart momentum factor. ∗, ∗∗, and ∗∗∗ indicate statistical significance at the 10, 5, and 1% levels.

PANEL A: Equal-weight portfolios

Month	[-48,-1]	[-48,-1]	[-48,-1]	[-36,-1]	[-36,-1]	[-36,-1]	[-12,-1]	[-12,-1]	[-12,-1]	[+1,+12]	[+1,+12]	[+1,+12]	[+1,+36]	[+1,+36]	[+1,+36]	[+1,+48]	[+1,+48]	[+1,+48]
Model	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5
Alpha	-0.001	-0.001	-0.003	0.004	0.004	0.002	-0.004	-0.006	-0.009	0.01	0.008	0.007	0.009	0.006	0.006	0.007	0.005	0.005
	[-0.364]	[-0.417]	[-0.933]	[0.78]	[0.895]	[0.463]	[-0.705]	[-1.207]	[-1.512]	[2.015]**	[1.554]	[1.281]	[2.192]**	[1.692]*	[1.518]	[1.814]*	[1.288]	[1.244]
Beta	0.01	0.008	0.009	0.01	0.008	0.009	0.01	0.008	0.01	0.013	0.011	0.012	0.012	0.01	0.011	0.012	0.01	0.011
	[12.431]***	[10.062]***	[9.918]***	[10.043]***	[7.372]***	[7.328]***	[9.166]***	[6.599]***	[7.106]***	[12.234]***	[8.733]***	[8.232]***	[14.125]***	[10.581]***	[9.678]***	[14.887]***	[11.516]***	[10.435]***
SMB		0.761	0.804		0.72	0.749		0.579	0.623		0.591	0.577		0.67	0.65		0.693	0.654
		[7.843]***	[6.904]***		[5.299]***	[4.597]***		[3.786]***	[3.448]***		[3.137]***	[2.921]***		[4.577]***	[4.224]***		[5.146]***	[4.563]***
HML		-0.075	0.097		-0.142	0.102		0.018	0.021		-0.029	-0.05		0.063	0.106		0.116	0.21
		[-0.76]	[0.626]		[-1.038]	[0.47]		[0.125]	[0.092]		[-0.193]	[-0.222]		[0.532]	[0.598]		[1.024]	[1.265]
RMW			0.166			0.135			0.325			0.147			0.03			-0.069
			[0.952]			[0.55]			[1.201]			[0.51]			[0.138]			[-0.333]
CMA			-0.304			-0.405			-0.117			-0.016			-0.085			-0.112
			[-1.437]			[-1.392]			[-0.375]			[-0.054]			[-0.356]			[-0.498]
MOM		-0.289			-0.354			-0.268			-0.169			-0.121			-0.132	
		[-4.728]***			[-4.217]***			[-2.989]***			[-1.879]*			[-1.671]*			[-1.949]*	
R squared	0.452	0.616	0.578	0.366	0.49	0.447	0.357	0.433	0.406	0.498	0.536	0.526	0.534	0.589	0.583	0.544	0.609	0.602
Observations	189	189	189	177	177	177	153	153	153	153	153	153	176	176	176	188	188	188

PANEL B: Value-weight portfolios

Month	[-48,-1]	[-48,-1]	[-48,-1]	[-36,-1]	[-36,-1]	[-36,-1]	[-12,-1]	[-12,-1]	[-12,-1]	[+1,+12]	[+1,+12]	[+1,+12]	[+1,+36]	[+1,+36]	[+1,+36]	[+1,+48]	[+1,+48]	[+1,+48]
Model	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5	CAPM	FFC4	FF5
Alpha	0.003	0.002	0.001	0.008	0.007	0.005	-0.003	-0.006	-0.013	0.016	0.012	0.017	0.012	0.01	0.011	0.01	0.009	0.01
	[0.895]	[0.668]	[0.137]	[1.714]	[1.501]	[1.103]	[-0.465]	[-0.989]	[-1.979]**	[2.433]**	[1.892]*	[2.57]**	[2.705]***	[2.395]**	[2.61]***	[2.592]***	[2.28]**	[2.502]**
Beta	0.01	0.009	0.01	0.01	0.01	0.01	0.01	0.009	0.013	0.012	0.007	0.006	0.011	0.008	0.008	0.011	0.009	0.009
	[13.089]***	[11.352]***	[11.12]***	[10.593]***	[8.947]***	[8.714]***	[7.655]***	[6.199]***	[7.857]***	[8.572]***	[4.976]***	[3.525]***	[11.377]***	[7.801]***	[6.72]***	[12.428]***	[9.008]***	[7.841]***
SMB		0.512	0.612		0.452	0.584		0.445	0.828		1.104	0.842		0.794	0.721		0.745	0.674
		[5.052]***	[5.27]***		[3.292]***	[3.711]***		[2.332]**	[3.937]***		[4.78]***	[3.504]***		[5.042]***	[4.355]***		[5.063]***	[4.334]***
HML		0.214	0.312		0.234	0.322		0.397	0.041		-0.096	0.28		-0.069	0.171		-0.017	0.254
		[2.078]**	[2.016]**		[1.689]*	[1.544]		[2.205]**	[0.152]		[-0.525]	[1.031]		[-0.538]	[0.903]		[-0.135]	[1.411]
RMW			0.278			0.341			1.187			-0.959			-0.214			-0.222
			[1.598]			[1.443]			[3.759]***			[-2.742]***			[-0.901]			[-0.989]
CMA			-0.317			-0.38			-0.153			-0.082			-0.347			-0.394
			[-1.501]			[-1.353]			[-0.424]			[-0.228]			[-1.361]			[-1.612]
MOM		-0.169			-0.157			-0.158			-0.32			-0.171			-0.161	
		[-2.652]***			[-1.846]*			[-1.413]			[-2.914]***			[-2.186]**			[-2.176]**	
R squared	0.478	0.559	0.558	0.391	0.442	0.448	0.28	0.33	0.388	0.327	0.436	0.432	0.427	0.507	0.501	0.454	0.527	0.524
Observations	189	189	189	177	177	177	153	153	153	153	153	153	176	176	176	188	188	188

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